

Remarks

Claims 17 and 18 have been amended. New claims 46 and 47 have been added. Claims 2-16 and 19-40 stand withdrawn under an election of species requirement now made final. Claims 1-47 are pending.

Examination and reconsideration of the application as amended is requested.

Support for claim 46 is found in the specification as filed, e.g., page 11 line 28 through page 12 line 6, page 12 lines 16-20, in the Examples such as Examples 10 and 11, and in the originally-filed claims such as claim 1. Support for claim 47 is found in the specification as filed, e.g., page 13 lines 16-23 and beyond, as well as in the Examples and in the originally-filed claims.

§ 112 Rejection

Claims 17 and 18 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention.

The Examiner stated that “or polyol” in line 7 of claim 17 lacked support. The enclosed amendment corrects the antecedent basis problem.

The Examiner stated that “e.g.” should be dropped from claim 18. The enclosed amendment adopts the Examiner’s suggestion.

Thus, Applicants submit that the rejection of claims 17 and 18 under 35 U.S.C. § 112, second paragraph, has been overcome, and that the rejection should be withdrawn.

§ 102 Rejections

I. Claims 1 and 41-44 stand rejected under 35 U.S.C. § 102(b) as purportedly being anticipated by “Biocidal Polyurethane and Its Antibacterial Properties,” J. Polym. Res., 5(3), 177-86, July 1998 (Wang).

The Examiner stated that Wang described “self-supporting” films “partially endcapped” with a quaternary antimicrobial group which is pendant to the structure (Office Action page 3). The Examiner stated that Wang described a polymer composition useful to treat solids (fibers), articles (coated fabrics) for medical use, aqueous dispersions to provide films, and coated fabrics (see id.).

Wang describes a polyurethane prepolymer that is chain-extended with diethylenetriamine to form a polyurethane polymer (see Abstract). Then Wang grafts epichlorohydrin onto the

polyurethane polymer, and this pendant epichlorohydrin is reacted with the biocide (see id.). Wang does not describe a polyurethane polymer encapped with a quaternary ammonium group.

In contrast, the present invention requires, *inter alia*, a polyurethane polymer “at least partially encapped with a group including at least one antimicrobial quaternary ammonium group” (claim 1). That is, the main chain of the polyurethane polymer itself is encapped in the present invention.

The Examiner’s argument does not show how Wang provides the biocidally-encapped polyurethane required in the present invention. Thus, all elements of the present invention have not been shown in Wang. The rejection of claims 1 and 41-44 under 35 U.S.C. § 102(b) as purportedly being anticipated by Wang is unwarranted and should be withdrawn.

II. Claims 1, 17, and 41-45 stand rejected under 35 U.S.C. § 102(b) as purportedly being anticipated by U.S. Patent No. 5,084,096 (Stovicek).

The Examiner stated that the Stovicek claims described a polyurethane treated with quaternary biocidal end groups to provide films, coatings, and articles (see Office Action p. 4). The Examiner also stated that an alkylene group attached the quaternary moiety to the polymer chain citing col. 2 and example 4 (see id.).

Claim 1 of Stovicek states that the resin has “directly bonded to their backbone repeating side chains of an active microbiocidal quaternary ammonium radical.” This does not fulfill the encapped polyurethane polymer requirement of claim 1 of the present invention. Similarly, the general formula and description in col. 2 of Stovicek describe a pendant chain “directly bonded to the polymer backbone” (col. 2 lines 15-27) and Example 4 of Stovicek describes epoxies, not polyurethane polymers. Thus, Stovicek fails to describe a polyurethane polymer at least partially encapped with a group including at least one antimicrobial quaternary ammonium group and cannot anticipate the present invention.

In summary, the rejection of claims 1, 17 and 41-45 under 35 U.S.C. § 102(b) as purportedly being anticipated by Stovicek is unwarranted and should be withdrawn.

§ 103 Rejections

Claims 1, 17, 18, and 41-45 stand rejected under 35 U.S.C. § 103 as purportedly being unpatentable over U.S. Patent No. 6,194,530 (Klesse, et al.) in view of Stovicek and further in view of U.S. Patent No. 5,408,022 (Imazato, et al.) and U.S. Patent No. 3,931,319 (Green, et al.).

The Examiner stated that Klesse provided the chain linking vinyl and quaternary antimicrobial groups to provide antimicrobial efficacy to polymers “inclusive of polyurethanes” (citing claim 1). The Examiner acknowledged that Klesse did not teach the quaternary moiety as an end group and that Klesse did not recite polyurethane formation.

The Examiner added Stovicek for the use of quaternary compounds for biocidal polymers including their use in medical devices, coatings, and shaped articles (col. 7 lines 9-44). Then the Examiner stated that Imazato described the instant vinyl as urethane polymerization units (col. 11, lines 12-19, Exs. 2-6 col. 12). The Examiner stated that Green described determining polymer length by capping with a quaternary ammonium moiety (cols. 1, 2).

Klesse does not describe, teach, or suggest polyurethane polymers. The Examiner acknowledged that Klesse did not recite polyurethane formation. Klesse only uses a urethane as one option in a linking group $-A_y-$, which group itself is optional, *i.e.*, y is 0 or 1. In fact, Klesse teaches away from even using the urethane stating “ $y = 0$ is preferred (col. 2 line 47). In addition, as acknowledged by the Examiner’s argument, Klesse does not teach the quaternary ammonium as an end group. Thus, the primary reference expressly teaches away from the claimed invention.

To this weak foundation, the Examiner’s argument adds Stovicek for quaternary compounds as biocidally effective in polymers. This combination still lacks the required polyurethane polymer at least partially encapped with a quaternary ammonium as required in all claims of the present invention.

The Examiner’s argument adds Imazato for the teaching of a vinyl in urethane polymerization citing col. 7 line 66 through line 63 of col. 8. However, Imazato describes only “urethane(meth)acrylic acid” and “urethane(meth)acrylates” in col. 7, not polyurethane polymers. Further, Imazato describes reacting a diisocyanate with a methacrylate having a hydroxyl group to form a “tri- or more functional monomer” (col. 8 lines 41-60). The Examiner’s argument does not show how this provides the polyactive hydrogen compound or the polyurethane polymer required by the present invention.

The Examiner cited Green for the teaching of capping a polymer with a quaternary ammonium moiety (see Office Action p. 5). The Green chemistry involves reacting a dihaloalkene (*e.g.*, 1,4-dichloro-2-butene) with a difunctional tertiary amine to extend the chains and a monofunctional tertiary amine to end the chains (see col. 1 line 67—col. 2 line 7). Thus, “the tertiary ammonium moieties are part of the linear polymeric chain” (col. 1 lines 5-7). The

Examiner's argument shows no motivation or suggestion to encap a polyurethane polymer. The Examiner's argument does not show any likelihood of success in combining these chemistries and thus provides no reasonable expectation of success in reaching the claimed invention.

From this piecemeal combination of features from four references, the Examiner's argument concludes that the Klesse reference discloses the essence of the present invention while the other references are "directed at the similar same [sic] methods and compositions to solve the same problems of the primary reference" (Office Action p. 5). The Examiner's argument further concludes that it would have been obvious to combine the selected features of each reference to reach the claimed invention.

The Examiner's argument attempts to combine selections from the free radical polymerization methods of Klesse and Imazato with the stepwise polymerization of Stovicek and then add the Green tertiary amine polymerization followed by chain termination. The Examiner's argument lacks any suggestion in the art to combine selected features from different chemistries to reach the claimed invention. There must be some suggestion in the prior art to make the combination. Absent such a showing in the prior art, the Applicants' teaching has been impermissibly used to hunt through the prior art for the claimed elements and combine them as claimed. *In re Laskowski*, 10 USPQ 2d 1397, 1398 (Fed. Cir. 1989). These references are devoid of any suggestion of the advantages of providing a polyurethane polymer encapped with a quaternary ammonium group. In particular, reviewing the combination of Klesse with Stovicek, there would have been no motivation or suggestion to use free radical method of Klesse which describes urethane as an optional linking group (which linking group is preferably absent) with the stepwise polymerization of Stovicek.

The only source of the noted advantages of the claimed polyurethane polymer is *Applicants' specification*, and it is improper to use this as the purported motivation for combining the references. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Finally, even if was proper to combine particular features from these four references, the resulting combination would not be a polyurethane polymer, as defined by claim 1. The Examiner's argument does not show how these references or their combination contains any suggestion for a polyurethane polymer derived from a polyisocyanate compound and a polyactive hydrogen compound at least partially encapped with a quaternary ammonium group, as defined by claim 1.

For all of these reasons, the invention defined by claim 1 is patentable over the cited references. As claims 17, 18, and 41-45 depend from claim 1, these claims are also patentable for the same reasons.

The rejection of claims 1, 17, 18, and 41-45 under 35 U.S.C. § 103 as purportedly being unpatentable over Klesse in view of Stovicek and further in view of Imazato and Green is unwarranted and should be withdrawn.

In view of the above, it is submitted that the application is in condition for allowance. Reconsideration of the application is requested. Allowance of claims of the pending claims, as amended, at an early date is solicited. If the Examiner feels that any remaining questions or issues may be resolved through a discussion with Applicants attorney, the Examiner is invited to contact me at the telephone number below.

Respectfully submitted,

13 Aug 2002
Date

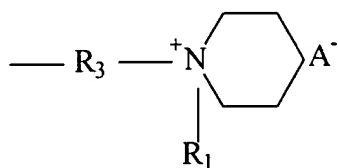
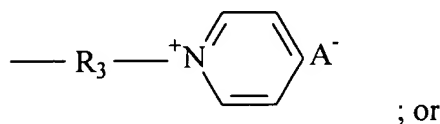
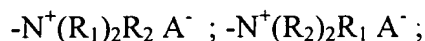
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Version With Markings to Show Changes Made

17. (First Amendment) The polymeric composition of claim 1, wherein the at least one antimicrobial quaternary ammonium group is located on an addition polymerized group and wherein said polyurethane polymer is derived from a monol or polyol vinylic compound and wherein the total equivalents of isocyanate used to form said polyurethane polymer is greater than the equivalents of active hydrogen groups contributed by said polyactive hydrogen compound used to form said polyurethane polymer and said monol or polyol vinylic compound, and the addition polymerization group is formed by reaction of said monol or polyol vinylic compound with a vinylic compound having at least one antimicrobial quaternary ammonium group.

18. (First Amendment) The polymeric composition of claim 17, wherein the one antimicrobial quaternary ammonium group of said vinylic compound is selected from



[Where] where each R_1 is independently C1-C4 alkyl optionally substituted in or on the chain by N, O, and S [(e.g. hydroxyethyl)], benzyl, C1-C4 substituted benzyl, and Ph-O-CH₂CH₂- where Ph= phenyl; R_2 is C8-C26 straight or branched chain alkyl or C8-C30 aralkyl optionally substituted in or on the chain by N, O and S; R_3 is a linkage group which is C8-C26 alkyl optionally substituted in or on the chain by N, O and S, and A is an anionic counter ion and is selected from halogen, alkyl sulfate, carboxylate, sulfonate, sulfate, phosphonate or phosphate.